



## **WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** 2003LA17B

**Title:** Use of Synchrotron Microtomography and X-Ray Fluorescence to Better Understand Contaminant Diffusion in Reactive Barrier Systems

**Project Type:** Research

**Focus Categories:** Sediments, Solute Transport

**Keywords:** Reactive Flow and Transport, Contaminated Sediments

**Start Date:** 03/01/2003

**End Date:** 02/28/2005

**Federal Funds Requested:** \$13,000

**Non-Federal Matching Funds Requested:** \$40,374

**Congressional District:** 6

**Principal Investigator:**  
Clinton S. Willson

### **Abstract**

Reactive barriers are capping materials that actively precipitate contaminants as they diffuse from contaminated sediment, rather than passively slowing the migration. The effectiveness of a reactive barrier depends on its ability to precipitate heavy metals from the pore solution onto the surface of the insoluble mineral by adsorption and surface precipitation. Continuous diffusion and subsequent precipitation within the reactive barrier also fills in the pore spaces around the materials, reducing permeability, and further inhibiting diffusion. The objective of this project is to continue the work where we are utilizing synchrotron X-rays to: (1) non-destructively quantify the diffusion of metals using X-ray fluorescence; and (2) quantify changes in the pore morphology of the reactive barrier using X-ray microtomography. Data and information obtained from these complementary experiments will help us better understand the pore-scale processes and phenomena impacting the transport of contaminant through reactive barrier systems. This work is also integrated with other research using X-ray absorption spectroscopy to look at such things as speciation. The end result of this study will be better models and/or criteria for the design of reactive caps.